CLAIMS

What is claimed is:

1. A technology element that calculates Multi-Axes Tool Compensation internal to the CNC controller while taking into consideration many internal factors of the machine itself, such as changes to offset positions, fixture alignments, tool shape, resharpened

5 tools, worn tools, physical head dynamics, mechanical styles and types, while doing the compensation for multiple axes in real time "on the fly" when encountering ever-changing machine conditions and user preferences. The steps and elements of which comprise:

10 a. The user setting his or her preferences into boxes on an operator screen, such as the example screen in FIG 1. for the boxes labeled tool size, horizontal offset, vertical offset, tool wear, corner radius, bottom angle, side angle and tool length.

15 b. The user must repeat the steps setting and entering his or her preferences for each tool description. There is no limit to the number of tools, machine types or tool shapes to enter.

  c. Reading into memory a user-provided file containing tool positions based
20   on non-compensated original part geometry data, which carries out the Multi-Axes tool compensation calculations.

2. An algorithm element according to claim 1. which does not store or pass the compensated positions by geometry alone but rather expands the intelligence of each
25 calculation for compensated tool positions based on an artificial intelligence algorithm element.

  a. The artificial intelligence algorithm element is actually a live, real-time, ever changing database in the machine's memory that remembers by learning from
30   what the machine can and cannot do. The database is an internal list of conditions and positions.

3. A Multi-Axes Tool Compensation element according to claim 1. which automatically calculates tool gouge avoidance protection internal to the CNC controller.
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  a. A method for Multi-Axes Tool Compensation which automatically contains algorithms to lift the tool to safe positions or skip the move when necessary by determining if the LLIMIT parameter, as shown on FIG 5. Dim "E" Item 7, is in violation of any surrounding obstacles as determined by a user-defined
40   value.

  b. A method which allows the machine operator to override the pre-defined tool characteristics by entering or setting defined values.

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45   c. A method which does not depend on the programmer to re-define tool position coordinates when the tool characteristics change.

    4. An algorithm element according to claim 1. which accounts for many machine tool types, styles and tool shape descriptions.

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